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water bacillus from the Thames, B. fluorescens liquefaciens, a pink bacterium (probably B. prodigiosus), the hay bacillus, the potato bacillus, and various yeasts and other fungi.

**The role of Calcium and Magnesium.**—Bokorny seems to have proved (*Bot. Centrb.*, 62:1) that Ca and Mg are essential to the formation of the necleus and chlorophyll bodies. His experiments were with Spirogyra, Zygnema, and Mesocarpus in Aluminum beakers in distilled water to which nutrient salts were added: (1) Ca withheld; (2) Mg withheld; (3) Ca and Mg withheld; (4) Complete. The algæ were under observation 6 weeks. In 1 there was a gradual decided shrinkage of the chlorophyll bands although starch continued to form. In 2 the nucleus and pyrenoids also shrank, the former to ¼ natural size or to complete disappearance. In 3 the nucleus shrank decidedly and the pyrenoids seemed to become smaller. In 4 the cell-organs remained normal and the plants continued bright green.—ERWIN F. SMITH.

## ZOOLOGY.

**The Faunal Regions of Australia.**—At the Adelaide meeting of the Australian Association for the Advancement of Science, Mr. Hedley gave a brief summary of the views held by leading naturalists in regard to the Faunal Regions of Australia, and also presented his own. The substance of his remarks were as follows:

The discrimination of the various provinces into which the Australian fauna and flora group themselves has been frequently attempted. To the earlier naturalists, from a study of scanty material and with little or no personal knowledge of the continent, four divisions of east and west, temperate and tropical, seemed natural and sufficient. Horker's "Essay on the Australian Flora" paved the way for a better understanding of the relations which various localities bore to each other. Owing to fundamental errors of his interpretation of Australian Geology, Wallace's treatment of the subject in "Island Life" is of but slight value. To the writer, the most successful arrangement of the various biological regions yet proposed is that sketched by Prof. Tate, in his address to the first meeting of this Association. The author accepts two main biological divisions—the *Autochthonian*, developed in west

Australia, and the *Euronotian*, seated in eastern Australia and Tasmania; a subsidary division, less in value and derivable from both of the above, is the *Eremian* or desert fauna and flora.

Taking this disposition as the basis of my remarks, I would observe that eastern Australia contains two distinct biological populations, where Professor Tate has located one, the *Euronotian.* This title, I propose, should be reserved for that fauna and flora characteristic of Tasmania, Victoria, and southern New South Wales; while the second and very distinct fauna and flora developed on the coasts of Queensland and northern New South Wales would best be described as Papuan. Indeed, so distinct is this latter, that a separation of Australian life into Papuan and non-Papuan seems to the writer to be the primary division to be made of the Australian fauna and flora.

The types encountered by a traveler in tropical Queensland, or rather in that narrow belt of tropical Queensland, hemmed in between the Cordillera and the Pacific, all wear a foreign aspect. Among mammals may be instanced the cuscus and tree kangaroo; among reptiles, the crocodile, the *Rana*, or true frog, and the tree snakes; among birds, the cassowary and rifle birds; among butterflies, the Ornithoptera; among plants, the wild banana, orange and mangosteen, the rhododendron, the epiphytic orchids, and the palms; so that, in the heart of a great Queensland "scrub," a naturalist could scarcely answer, from his surroundings, whether he were in New Guinea or Australia. It may be supposed that late in the Tertiary epoch, Torres Straits, now only a few fathoms deep, was dry land, and that a stream of Papuan life poured into Australia across the bridge so made.

Sharply defined from the tropical jungle above mentioned are areas occupied by strictly Australian vegetation, which are left invariably in possession of the poorest tracts of land. From the rich lands, formerly no doubt possessed by them, everywhere have they been ousted by the invading flora.

Regarding the origin of the Eurontian fauna and flora, sundry facts collected by Mr. H. O. Forbes, in his paper on the Chatham Islands, would suggest a South American source. Assuming that, in or before the Miocene, continuous land extended from Terra del Fuego to Tasmania, the derivation of the Australian marsupials appearing in the Pliocene from their South American allies, *Prothylacinus* and *Amphiproviverra* of the Eocene, would be clear. Mr. Forbes adduces strong confirmatory evidence from Professor Parker who, on embryological grounds, does not hesitate to assume as ancestors of certain Australian crows a form allied to the American Dendrocalaptine birds. The distribution of the parrots and the cystignathous frogs appears also to sustain the theory. The extinct alligator, *Palimnarchus*, found in Queensland and New South Wales associated with *Diprotodon*, strengthens the chain of evidence, as does the occurrence in Tasmania and Australia of *Gundlachia*, otherwise an exclusively American mollusc.

As the name implies, the *Autochthonian* is the oldest member of the Australian faunas and floras. The date of its arrival in Australia and the route which it traversed are lost in antiquity. Seeing that many resemblances exist between our vegetation and those of Timor and the southeast Austro-Malayan islands, perhaps these lands afforded the passage to Australia.

Summary.—Superimposed, one above another, may be distinguished three divisions of Australian life. The earliest is the Autochthonian. Possibly this arrived from the Austro-Malayan islands, in or before the Cretaceous era, and spread over the whole of Australia. The next is the Euronotian. Probably this reached Tasmania from South America, not later than the Miocene epoch ; many of the original inhabitants, particularly on the east coast, probably disappeared before the invaders. Thirdly, a contingent of Papuan forms seized on the Queensland coast, late in the Tertiary, and likewise largely exterminated their predecessors.

**Notes on a Snapping Turtle's Nest.**—On June 16, 1894, I saw a snapping turtle, *Chelydra serpentina*, in the course of two hours, dig a hole and in it lay twenty-two eggs.

The hole was dug in gravel and was small at the top, but when an inch below the surface of the ground, it widened, and when finished was three inches in diameter and about four inches deep The digging was done entirely by the hind feet used alternately.

The eggs were crowded in place by the hind feet, as fast as they were laid. Then the hole was filled even with the rest of the ground. The nearest water was a small stream about thirty feet distant.—A.

**On some new North American Snakes,** NATRIX COMPRESSICAUDA TÆNIATA subsp. nov.—Scales in twenty-one rows ; four series of longitudinal spots above, those of the median pair forming two longitudinal stripes on the greater part of the length ; the laterals forming stripes on the neck only.

Labials $\frac{8}{10}$, oculars 1–3 ; temporals 1–3. Frontal narrow, not widened anteriorly ; parietals rather wide. First row of scales keeled.

Gastrosteges 131; anal 1-1; urosteges 82. The lateral black spots extend as far as the tail. The dorsal stripes are connected by a transverse lighter brown shade for a short distance in advance of the vent. Belly black with a median series of semidiscoid yellow spots; gastrosteges with yellow extremities for the anterior two-thirds of the length of the body. The median neck stripes touch on the nape, and after enclosing a pale space unite on the parietal plates. Muzzle brown, the labials with blackish shades. Lower labials, genials and gulars with yellow spots. Indistinct parietal paired spots. Total length 378 mm.; of tail 98 mm.

Two specimens in my private collection from Volusia, Florida.

In this form the striping which appears on the neck of the form *compressicauda* is extended the entire length. It bears thus a partial resemblance to the *Natrix clarkii,* which is not far removed in affinity from the *N. compressicauda.* The form next described (*N. fasciata pictiventris*) connects the latter with the *N. fasciata.*

The subspecies *tæniata* may be synoptically compared with the typical *compressicauda* as follows:

Scales in 21 rows; four series of longitudinal spots above, those of the median pair forming two longitudinal stripes on the greater part of the length; the laterals forming stripes on the neck only; *N. c. tæniata.*

Scales in 21 rows; numerous dark cross-bands which are resolved into three rows of spots just anterior to the tail, and four longitudinal stripes on the neck; *N. c. compressicauda.*

NATRIX FASCIATA PICTIVENTRIS Cope.—Brown transverse bands numerous, separated by short intervals and extending to the belly throughout the length. Gastrosteges narrowly margined at the base with brown, the margins turning at or before reaching the ends of the gastrosteges and uniting so as to enclose transverse yellowish spots, which may cover a part only or the whole of the gastrostege, but which are always wider than those seen in *N. compressicauda.* Sides of head light brown, generally with a black post-ocular band; top of head black. Scales in 25 rows; in one specimen (No. 19,798) in 27 rows.

No. 5,473 : 25; 8 : 125; 45 : 580 mm.; 120 mm.; (tail injured).

No. 19,999 : 25; 8 : 124; 86 : 550 mm.; 162 mm.

In some specimens (No. 13,729) the transverse bands are very distinct as in young individuals; in Nos. 19,798 and 11,444, they are connected by the same color along the median dorsal line.

This subspecies is restricted to Florida, and it approaches the *N. compressicauda* in the coloration of the belly. The following specimens are contained in the U. S. National Museum.

5,473 1, Palatka, Fla., T. Glover. Type, 10,449 2, Gainesville, Fla., J. Bell; 10,739 1, Clearwater, Fla., S. T. Walker; 11,444 1, Gainesville, Fla., J. Bell; $\left.\begin{matrix}13644\\13693\end{matrix}\right\}$ 2, Georgiana, Fla., G. Wittfield; 13,779 1, Punta Rassa, Fla., C. K. Ward; 19,798 1, W. Florida, Dr. Henshall; 19,999 1, Lake Eustis, Fla., Theo. Holm.

In my private collections are specimens from Volusia, Lake George, Fla. A specimen now living in the reptile house of the Zoological Garden of Philadelphia exhibits the following colors. The borders of the transverse bars, and the markings on the belly are chestnut red, while the ground-color of the latter is cream colored.

SEMINATRIX PYGÆUS Cope, gen. nov.—*Contia pygæa* Cope, *Tropidonotus pygæus* Boulenger. This species has been referred to the water snakes of the genus Tropidonotous (Natrix) by Boulenger (Catal. Snakes Brit. Mus. Ed. II, V. 1). An examination of the penial structure shows that the reference to the Natricinæ is correct. The other characters differ, however, from those of the genus Natrix, so that it appears to be necessary to refer it to a new genus. This I propose to call Seminatrix, and give the following definition. Sulcus spermaticus and hemipenis undivided; no papilla; scales smooth, without keel or pits; anal plate divided.

The only known species *S. pygæa* is found in Florida. According to Dr. Loennberg.[1] its habits are aquatic. While the epidermal scales are smooth, the dermal plates are closely wrinkled and reticulated, a character which I have not observed in any other Natricine and which may be an additional generic character.

ZAMENIS STEJNEGERIANUS sp. nov.—This species and the one following belong to a section of the genus not represented in my "Critical Review" (p. 622), which must be characterized as follows: Superior labials eight; scales in seventeen rows; frontal as wide posteriorly as the superciliary at the same point. To this this might be added, loreal much longer than deep.

In the present species the profile is gently convex, and the rostral plate is slightly prominent. The frontal plate has straight lateral borders and its anterior angles are well removed from the preocular plates. The loreal is twice as long as deep, and its superior posterior corner is cut off as a separate plate on both sides, and on one, a third loreal is cut off below. The eight superior labials are regular, and apparently normal. The parietals are truncate posteriorly, and are bounded by three temporals and two small scales externally. Temporals 2–2–2. Postgenials shorter than pregenials. Gastrosteges 166; anal 1–1; urosteges 102. Length 782 mm.; of tail, 229 mm.

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[1] Proceeds. U. S. Natural Museum, 1894 p. 323.

Above and ends of gastrosteges, light brownish-olive; top of head, lips, and inferior surfaces yellow. Skin between scales, black. No. 17,065 U. S. National Museum, Cameron Co., Tex. Dedicated to my friend Dr. L. Stejneger of the U. S. National Museum.

ZAMENIS CONIROSTRIS sp. nov.—The second species of the section of the American species of the genus presents the following characters.

Profile of muzzle much decurved; rostral plate prominent and subconic. Frontal plate with concave lateral borders, and expanded front, in contact with preoculars. A single loreal which is nearly twice as long as deep, and is deeper posteriorly than anteriorly. Parietal plates rounded posteriorly, bordered by three temporals and two or three scales. Temporals 2–2–2. Superior labials normal, regular. Postgenials equal in length to pregenials. Gastrosteges 162; anal 1–1; urosteges 85. Length 758 mm. length of tail 200 mm.

The specimen may have been taken near the period of moult, so that the color is somewhat uncertain. It is now light brown above, and light plumbeous below; the top of the head not lighter than the other superior surfaces. The muzzle is darker in color than the lips and throat. Skin between scales black. No. 1,763 U. S. National Museum, Matamoras, Mex.

This species and the last are founded on a single specimen each, which were obtained in nearly the same region of country. They resemble each other considerably in proportions, size and coloration. The differences are, however, so numerous and important that it is impossible to regard them as belonging to the same species. They differ equally from all others, the nearest approach to the *Z. stejnegerianus* being made by abnormal individuals of the flaviventris form of *Z. constrictor*, which have eight superior labial shields. The very different form of the loreal plate, and its subdivison, in the latter, together with the contrast between the color of the head and the dorsum, will distinguish it.

ZAMENIS LATERALIS FULIGINOSUS Cope.—*Bascanium laterale* Hallow. Cope, Proceeds. U. S. Natl. Mus., 1889, f. 147.

Scales in seventeen longitudinal rows; superior labials eight, the fourth and fifth entering the orbit. Muzzle depressed, narrowed and rather prominent. Frontal plate much narrowed posteriorly, its width equal one-half that of a superciliary plate. Seventh and eighth superior labials about equal, of rather wide parallelogrammic form. Temporals 2–2–2; the last superior large, subquadrate, their posterior borders continuous with that of the parietals. Gastrosteges strongly angulated; tail entering 3·58 times in whole length. Scuta, scutella and dimensions:

No. 15,135; 201; 1–1; ? ; 815 mm.; tail injured.
No. 15,136; 205; 1–1; 108; 665 mm.; 258 mm.

Color above blackish-brown anteriorly, becoming lighter posteriorly to the end of the tail. The dark color extends on each end of the gastrosteges to the angulation throughout the length, and in the younger specimen, appears as a row of spots on each side of the middle part of the gastrosteges, fading out beyond the middle of the length. Ground color of belly yellow. In the larger specimen the black-brown predominates on the inferior surfaces, yielding gradually to the ground color, which predominates on the inferior surface of the tail. A yellow spot on the preocular; and in the younger specimen on the postoculars and labial plates. Gular and genial plates yellow spotted in the younger specimen, nearly uniform dark brown in the older. On the anterior part of the body of the younger specimen the lateral scales to the third and fourth row have brown shades, with an obscure trace of cross-banding. On the same specimen near the middle of the body, there are two pale half-cross-bands near together. In the same, the center of each parietal plate is brown.

This subspecies differs widely from the typical form in color characters.

I add here that specimen which strongly resembles this form was sent to the Philadelphia Zoological Garden from Southern Arizona. The belly is light red.

| Catal. no. | No. specimens | Locality | Whence obtained |
|---|---|---|---|
| 15,135<br>15,136 | 1<br>1 | St. Margarita Island, Lower California | U. S. Fish Commission Albatross |

—E. D. Cope.

**Zoological News,** Vermes.—*Distomes.* Dr. H. B. Ward has recently published several papers on these parasites to which attention should be called, since they appear in places where one does not usually look for zoological articles. In the first[1] he records a second American example of the fluke, *Distomum westermannii*, this time from the lungs of a dog, the material being furnished by Prof. D. S. Kellicott, and being that upon which the latter author had already reported.[2] The second of these papers[3] reviews the literature of this same parasite and emphasizes the dangerous nature of it when present in man. In the East (Japan, Formosa, etc.) it occurs in a large percentage of the population. A third paper[4] records the presence of *Distomum felinum* in the cats sacrificed to science in the University of Nebraska. In this paper, Dr. Ward discusses the value of measurements and concludes that they are of little value; "the topographical relations alone are fixed and hence are the only points on which species may be founded."

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[1] Veterinary Magazine, Vol. II, p. 87, 1895.

[2] Trans. Ohio State Medical Society, 1894.

[3] Medical News, Mar. 2, 1895.

PROTOCHORDATA.—A species of Enteropneustan has been discovered upon the shores of New South Wales. It is described by its finder, J. P. Hill, under the name *Ptychodera australiensis* (Proc. Linn. Soc. N. S. Wales, Nov. 28, 1894).

## ENTOMOLOGY.[1]

**Distribution of Injurious Insects.**—In an interesting paper upon this subject before the Entomological Society of Washington, Mr. L. O. Howard said: "It is reasonable to suppose that in many cases insects will be unable to follow their food-plants to the limits of their possible range, notwithstanding the fact that the geographical distribution of animals and plants is governed by the same general laws of temperature, humidity, exposure, and geological characteristics. The obvious reason for this is, that purely artificial features are introduced in cultivating plants, varieties are propagated which develop resistant powers lacking in the parent stock; seeds, in the case of annuals, are carefully collected and selected, the soil is prepared for their reception, and is artificially fertilized; while with perennials the same general care is taken. It follows, therefore, that the natural range of cultivated species is widely extended in every direction, and in the teeth of the very barriers which naturally would have held them rigidly in check. Plant-feeding insects in general follow the natural distribution of their specific food. Experience has shown that as this natural food becomes a cultivated crop they increase. As the cultivation of the crop is spread along natural lines of distribution, they follow it. When, however, by

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[4] Veterinary Magazine, 1895.

[1] Edited by Clarence M. Weed, New Hampshire College, Durham, N. H.